

Flow sensors SFAH

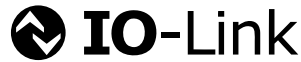
FESTO



Key features

At a glance

Communication interface



Universal flow measurement

- 8 flow measuring ranges from 0.002 l/min to 200 l/min
- High measuring dynamics (1:50)
- Available as uni- or bidirectional
- Excellent accuracy
- Optional test report

Quick installation

- No run-in sections required
- Adjustable QS elbow connections
- L1 and M8 plug for fast commissioning



Practical design

- Compact design 20x58 mm
- Degree of protection IP40 or IP54

Easy operation

- Clear 2-line display
- Configurable red surround for the entire display
- Intuitive menu navigation

Switchable electrical outputs

- Various switching functions
- Switching outputs (PNP/NPN, NO/NC)
- Analogue outputs (0...10 V, 1...5 V, 4...20 mA)

Product description

The flow sensor SFAH is suitable for monitoring compressed air and non-corrosive gases. The sensor can be used in many industries thanks to its compact design. The method of measurement is based on the thermal heat-transfer method. The bypass construction means that it is less susceptible to disruption by particles and moisture. The flow value is transmitted to the connected control system as a switching signal, as an analogue signal or via IO-Link®.

Area of application

- Process monitoring
- Handling of extremely small parts
- Monitoring of compressed air consumption
- Leak test
- Monitoring of forming gas
- Pneumatic object detection via air-gap measurement

Functions

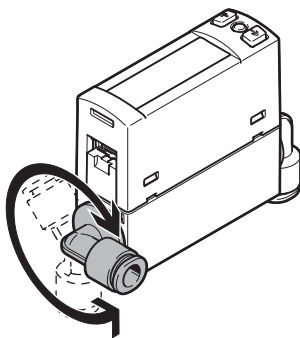
- Monitoring and setting a flow rate threshold, a flow rate range or a change in flow rate
- Monitoring using the teach-in function or by entering values
- Mass flow rate and volumetric flow rate are displayed in the common measurement units
- ECO function with option to switch off the display
- Optional security code can be freely chosen (4-digit code)
- Adjustable low-pass filter for smoothing the flow signal
- Scaling the analogue output to increase the signal dynamics
- Offset compensation possible
- Min./max. value memory
- All settings that have been entered on one sensor (master) can be transferred (replication) to other, identical sensors (devices)
- High pressure range –0.9 bar to 10 bar

IO-Link

- Serial communication integrated using IO-Link 1.1
- Cyclical transfer of two switching statuses and the measured pressure value
- The sensor can be parameterised remotely using an IO-Link® master
- Easy sensor replacement with automatic parameterisation
- Sensor identification, diagnostics and teach-in possible via IO-Link

Space-saving

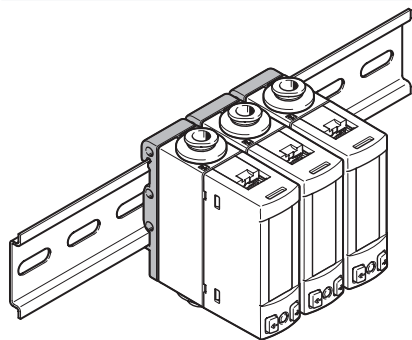
Adjustable QS elbow connections



Key features

Mounting options

H-rail mounting



Safety guard

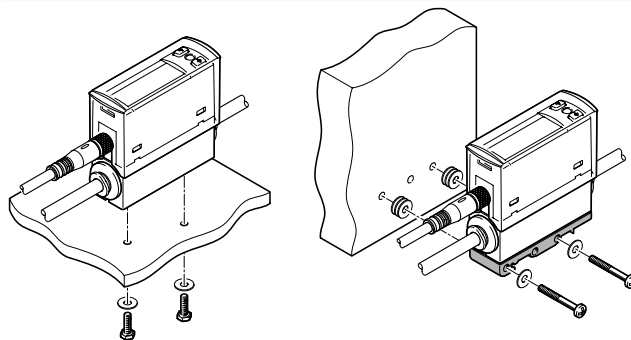


Plate mounting from beneath

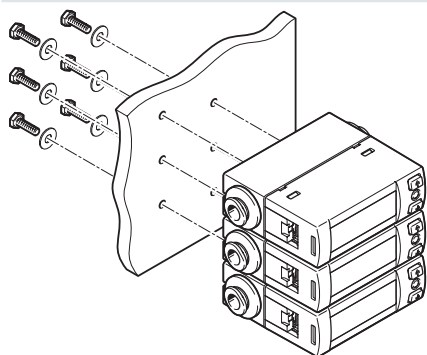
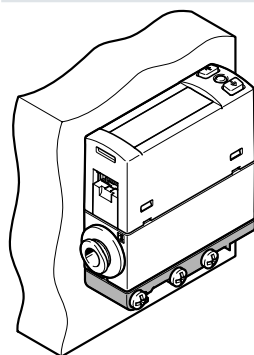
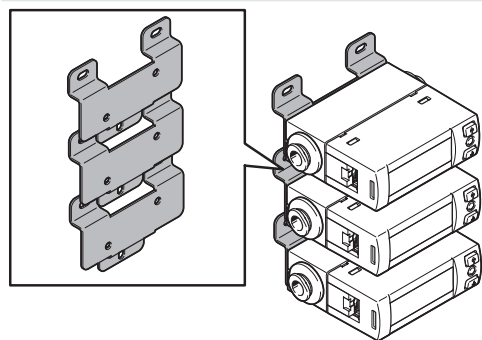


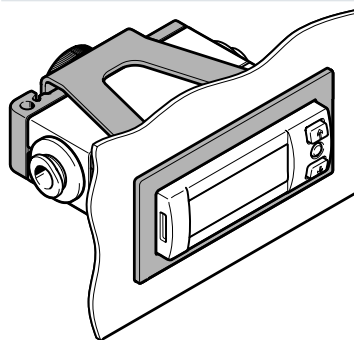
Plate mounting from the side



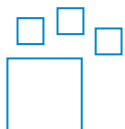
Wall mounting



Front panel mounting



Ordering data – Product options

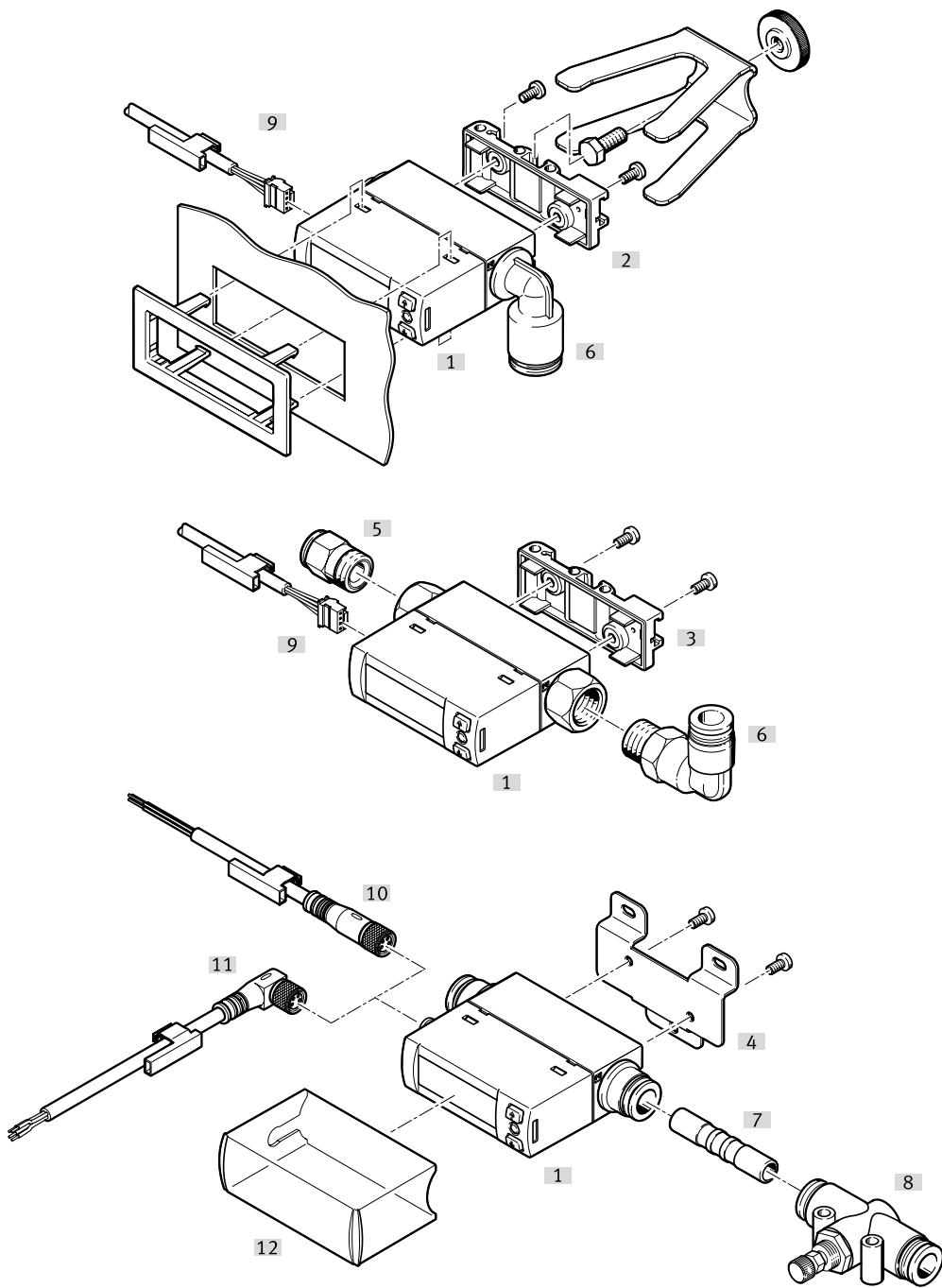


Configurable product
This product and all its product options can be ordered using the configurator.

The configurator can be found under Products on the DVD or at
→ www.festo.com/catalogue/...

Part no.	Type
8035300	SFAH

Peripherals overview



Accessories		→ Page/Internet
[1]	Flow sensor SFAH	6
[2]	Panel mounting kit SAMH-FH-F	15
[3]	H-rail mounting SAMH-FH-H	14
[4]	Wall mounting SAMH-FH-W	14
[5]	Push-in fitting QS	16
[6]	Push-in fitting QSL	16
[7]	Push-in sleeve	-
[8]	One-way flow control valve GRO-QS-...	gro
[9]	Connecting cable NEBS-L1G4-...	16
[10]	Connecting cable NEBU-M8G4-...	16
[11]	Connecting cable NEBU-M8W4-...	16
[12]	Safety guard SACC-FH-G-S3, only in combination with electrical connection M8	15

Type codes

001	Series	
SFAH	Flow sensor	

002	Flow measuring range	
0.1	Max. 0.1 l/min	
0.5	Max. 0.5 l/min	
1	Max. 1 l/min	
5	Max. 5 l/min	
10	Max. 10 l/min	
50	Max. 50 l/min	
100	Max. 100 l/min	
200	Max. 200 l/min	

003	Flow rate input	
B	Bidirectional	
U	Unidirectional	

004	Pneumatic connection	
G18	G1/8	
G14	G1/4	
Q4	Push-in connector 4 mm	
Q6	Push-in connector 6 mm	
Q8	Push-in connector 8 mm	

005	Thread type	
	None	
F	Female	

006	Outlet orientation	
S	Straight	
AR	Angled, adjustable	

007	Electrical output 1	
PNLK	PNP/NPN/IO-Link	

008	Electrical output 2	
PNVBA	PNP or NPN or 0 ... 10 V or 1 ... 5 V or 4 ... 20 mA	

009	Electrical connection	
L1	Plug type L1	
M8	Plug M8, A-coded	

010	Mounting accessories	
H	H-rail mounting	
FP	Front panel mounting kit	
W	Wall mounting	

011	Electrical accessories	
	None	
2.5A	Angled socket, cable 2.5 m	
2.5S	Straight socket, cable 2.5 m	
5A	Angled socket, cable 5 m	
5S	Straight socket, cable 5 m	

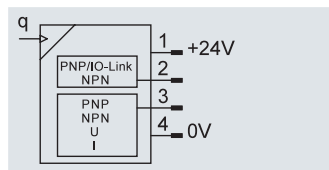
012	Protective devices	
	None	
G	Protective hood	

013	Certificate	
	None	
T	Test report	

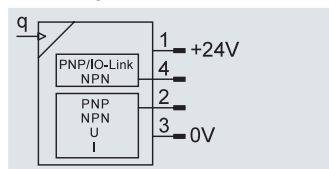
Data sheet

Function

SFAH-...-L1



SFAH-...-M8



- Flow rate
 - 0.002 ... 0.1 l/min
 - 0.01 ... 0.5 l/min
 - 0.02 ... 1 l/min
 - 0.1 ... 5 l/min
 - 0.2 ... 10 l/min
 - 1 ... 50 l/min
 - 2 ... 100 l/min
 - 4 ... 200 l/min
- Maximum versatility and reduced warehousing thanks to switchable electrical outputs
- Measuring signal filter for setting the rise time
- Additional filter for smoothing the display values



General technical data

Certification	RCM compliance mark c UL us listed (OL)
CE marking (see declaration of conformity)	To EU EMC Directive To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC To UK RoHS instructions
KC mark	KC EMC
Certificate issuing authority	UL E322346
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364-B2-L

Input signal, measuring element		-0.1	-0.5	-1	-5	-10	-50	-100	-200
Measured variable		Mass flow rate, volumetric flow rate							
Flow direction	B	Bidirectional							
	U	Unidirectional							
Measuring principle		Thermal							
Measurement method		Heat transfer							
Flow measuring range start value	[l/min]	0.002	0.01	0.02	0.1 ²⁾	0.2	1	2	4
Flow measuring range end value ¹⁾	[l/min]	0.1	0.5	1	5	10	50	100	200
Operating pressure	[bar]	-0.9 ... 10							
Operating medium		Compressed air to ISO 8573-1:2010 [6:4:4] Nitrogen Argon							
Temperature of medium	[°C]	0 ... 50							
Ambient temperature	[°C]	0 ... 50							
Nominal temperature	[°C]	23							

- 1) For feature ...B-...: The measuring range applies in both the positive and negative direction.
- 2) For low leakage requirements in the lower measuring range, use G1/4 or G1/8 female thread in combination with pneumatic connection.

Output, general

Accuracy of flow rate		+/- (2% o.m.v. + 1% FS)
Repetition accuracy zero point	[%FS]	±0.2
Repetition accuracy span	[%FS]	±0.8
Temperature coefficient span	[%FS/K]	Typ. ±0.15 (max. ±0.3)
Pressure influence span ¹⁾	[%FS]	Typically ±1 (in the pressure range -0.7 ... 10 bar)

- 1) In the pressure range -0.9 ... -0.7 bar, an additional pressure influence span of typically ±4% FS can be expected.

Data sheet

Switching output		
Switching output		2 x PNP or 2 x NPN, switchable
Switching function		Window comparator
		Threshold value comparator
		Auto difference monitoring
Switching element function		N/C or N/O, switchable
Max. output current	[mA]	100

Analogue output				
Analogue output	-PNVBA-	0 ... 10 V	1 ... 5 V	4 ... 20 mA
Max. load resistance of current output	[ohm]	500		
Min. load resistance of voltage output	[kOhm]	20		

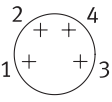

Output, additional data	
Short circuit current rating	Yes
Overload protection	Provided

IO-Link device to IEC 61131-9	
Protocol	IO-Link
Protocol version	Device V 1.1
Profile	Smart sensor profile
Function classes	Binary data channel (BDC)
	Process data variable (PDV)
	Identification
	Diagnostics
	Teach channel
Communication mode	COM2 (38.4 kBd)
SIO mode support	Yes
Port class	A
Process data width IN	3 bytes
Process data content IN	2 bit BDC (flow monitoring)
	1 bit BDC (volume monitoring)
	14 bit PDV (measured flow value)
Service data content IN	32 bit PDV (measured volume value)
Minimum cycle time	4 ms
Data memory required	< 0.5 KB

Electronics		
Operating voltage range DC	[V]	22 ... 26
Idle current	[mA]	≤ 25
Reverse polarity protection		For all electrical connections

Data sheet

Electromechanical systems		M8	L1
Connection type	Plug		
Connection technology	M8x1, A-coded to EN 61076-2-104	L1	
Number of pins, wires	4		

Terminal allocation		
	Pin	Meaning
M8		
	1	Operating voltage +24 V
	2	Electrical output 2 (OutB or Anlg)
	3	Operating voltage 0 V
	4	Electrical output 1 (OutA, C/Q line for IO-Link)
L1		
	1	Operating voltage +24 V
	2	Electrical output 1 (OutA, C/Q line for IO-Link)
	3	Electrical output 2 (OutB or Anlg)
	4	Operating voltage 0 V

Mechanics		-Q4	-Q6	-Q8	-G18F	-G14F
Type of mounting	Via accessories					
Mounting position	Optional					
Pneumatic connection	For tubing O.D. 4 mm	For tubing O.D. 6 mm	For tubing O.D. 8 mm	Female thread Ø G1/8	Female thread Ø G1/4	
Outlet orientation	S	Straight				
	AR	Angled, adjustable				-
Product weight	[g]	60			90	
Materials						
Housing	PA-reinforced					
Materials in contact with the media	NBR					
	Silicon					
	PA-reinforced					
	Silicon nitride					
	High-alloy stainless steel					
	Epoxy					
Anodised wrought aluminium alloy						

Data sheet

Display/operation	
Display type	Multi-coloured, illuminated LCD
Displayable units	
	0.1 l/min, l/h, scft/h, g/min, l, scft, g
	0.5
	1
	5 l/min, l/h, scft/min, scft/h, g/min, l, scft, g
	10
	50 l/min, scft/min, scft/h, g/min, l, scft, g
	100
	200
Setting options	Teach-in
	IO-Link
	Via display and pushbuttons
Tamper-proof	IO-Link
	PIN code

Immissions/emissions	0.1	0.5	1	5	10	50	100	200
Degree of protection ¹⁾	IP40							
Maximum permissible leakage [l/h]	0.1							
Pressure drop delta p ²⁾ [mbar]	< 5					12	15	56
Protection class	III							
Corrosion resistance class CRC ³⁾	2							
Cleanroom class	Class 4 to ISO 14644-1							
Pollution degree	3							

1) Protection to IP54 is provided in combination with a safety guard mounted horizontally as illustrated on page 3.

2) With 6 bar at the input and q max.

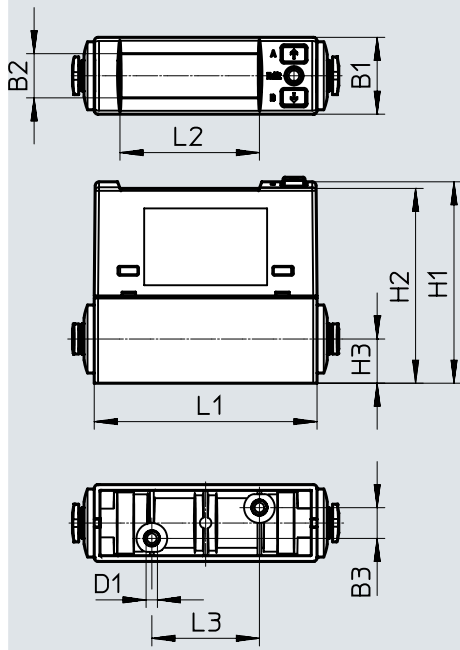
3) Corrosion resistance class CRC 2 to Festo standard FN 940070

Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Data sheet

Dimensions

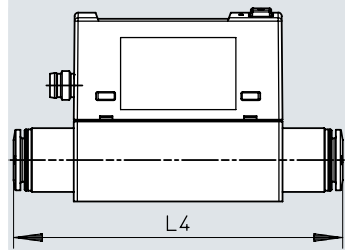
Download CAD data → www.festo.com



Type	B1	B2	B3	D1	H1	H2	H3	L1	L2	L3
SFAH- ...	20	11.5	8	M3	~52.4	50.7	11.5	58	36.3	28

Dimensions

Download CAD data → www.festo.com

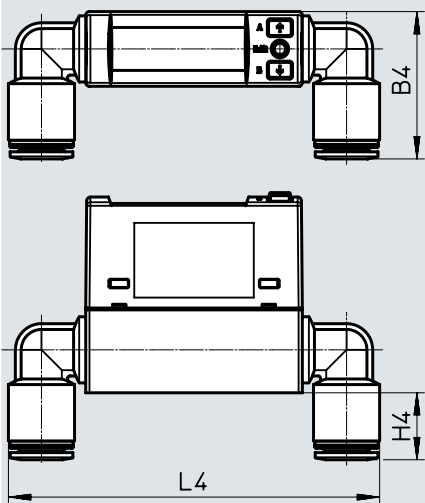


Type	L4 max.
SFAH- ... -Q4S- ...	70
SFAH- ... -Q6S- ...	70
SFAH- ... -Q8S- ...	85

Data sheet

Dimensions

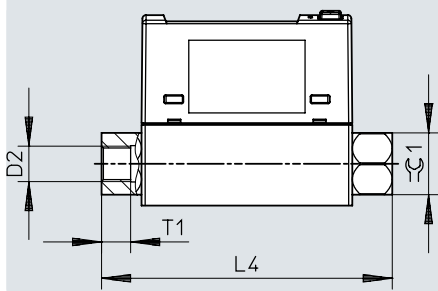
Download CAD data → www.festo.com



Type	B4 max.	H4 max.	L4 max.
SFAH- ... -Q4AR- ...	30	8	83
SFAH- ... -Q6AR- ...	31	9	88
SFAH- ... -Q8AR- ...	38	17	98

Dimensions

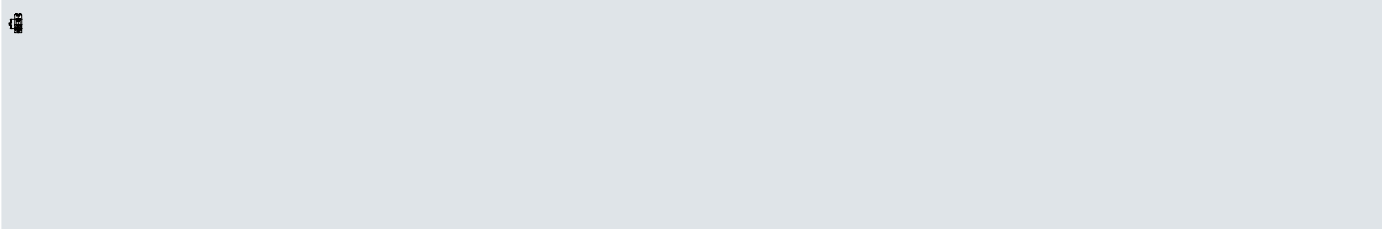
Download CAD data → www.festo.com



Type	D2	L4	T1	± 0.1
SFAH- ... -G14FS- ...	G1/4	80	12	17
SFAH- ... -G18FS- ...	G1/8	80	8	17

Dimensions

Download CAD data → www.festo.com

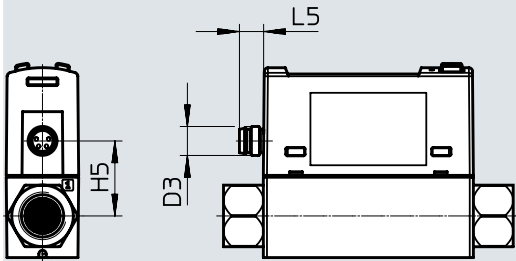


Type	H5
SFAH- ... -L1	26.3

Data sheet

Dimensions

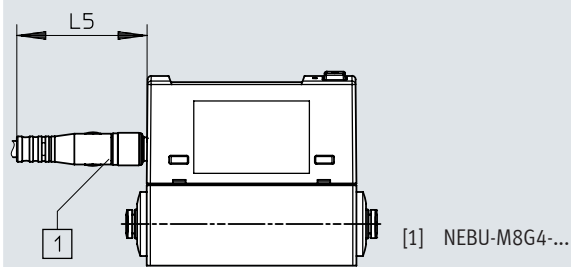
Download CAD data → www.festo.com



Type	D3	H5	L5
SFAH- ... -M8	M8x1	20.7	~6.6

Dimensions

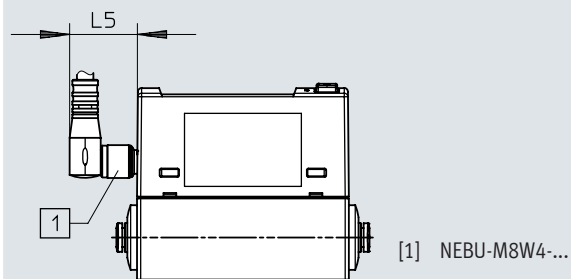
Download CAD data → www.festo.com



Type	L5
SFAH- ... -M8	~35.9

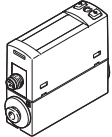
Dimensions

Download CAD data → www.festo.com



Type	L5
SFAH- ... -M8	~18.5

Data sheet

Ordering data Design	Flow measuring range [l/min]	Connection type	Part no.	Type
	0.1 l/min	Female thread G1/8	8158411	SFAH-0.1U-G18FS-PNLK-PNVBA-M8
			8158427	SFAH-0.1B-G18FS-PNLK-PNVBA-M8
			8159375	SFAH-0.1U-G18FS-PNLK-PNVBA-L1 ¹⁾
	0.5 l/min	For tubing O.D. 6 mm	610916	SFAH-0.5U-Q6S-PNLK-PNVBA-M8
		For tubing O.D. 4 mm	8158412	SFAH-0.5B-Q4S-PNLK-PNVBA-M8
	0.1 l/min	For tubing O.D. 4 mm	8058461	SFAH-0.1U-Q4S-PNLK-PNVBA-L1
			8058462	SFAH-0.1U-Q4S-PNLK-PNVBA-M8
	0.5 l/min	For tubing O.D. 4 mm	8058463	SFAH-0.5U-Q4S-PNLK-PNVBA-L1
			8058464	SFAH-0.5U-Q4S-PNLK-PNVBA-M8
	1 l/min	For tubing O.D. 4 mm	8058465	SFAH-1U-Q4S-PNLK-PNVBA-L1
			8058466	SFAH-1U-Q4S-PNLK-PNVBA-M8
			8158413	SFAH-1B-Q4S-PNLK-PNVBA-M8
	5 l/min	For tubing O.D. 6 mm	8158418	SFAH-1U-Q6S-PNLK-PNVBA-M8
			8058467	SFAH-5U-Q6S-PNLK-PNVBA-L1
			8058468	SFAH-5U-Q6S-PNLK-PNVBA-M8
	10 l/min	For tubing O.D. 6 mm	8158414	SFAH-5B-Q6S-PNLK-PNVBA-M8
			8058469	SFAH-10U-Q6S-PNLK-PNVBA-L1
			8058470	SFAH-10U-Q6S-PNLK-PNVBA-M8
	50 l/min	For tubing O.D. 8 mm	610783	SFAH-10B-Q6S-PNLK-PNVBA-M8
			8158423	SFAH-10U-Q6AR-PNLK-PNVBA-M8
		Female thread G1/8	8058471	SFAH-50U-Q8S-PNLK-PNVBA-L1
			8058472	SFAH-50U-Q8S-PNLK-PNVBA-M8
			8058473	SFAH-50U-G18FS-PNLK-PNVBA-M8
			8158415	SFAH-50B-Q6S-PNLK-PNVBA-M8
			8158419	SFAH-50U-Q6S-PNLK-PNVBA-M8
	For tubing O.D. 6 mm	8158424	SFAH-50U-Q6AR-PNLK-PNVBA-M8	
		8158426	SFAH-50U-Q6AR-PNLK-PNVBA-L1	
	100 l/min	For tubing O.D. 8 mm	8058474	SFAH-100U-Q8S-PNLK-PNVBA-L1
			8058475	SFAH-100U-Q8S-PNLK-PNVBA-M8
		Female thread G1/4	8058476	SFAH-100U-G14FS-PNLK-PNVBA-M8
8158416			SFAH-100B-G14FS-PNLK-PNVBA-M8	
8158420			SFAH-100U-Q6S-PNLK-PNVBA-M8	
For tubing O.D. 6 mm	8158422	SFAH-100U-G14FS-PNLK-PNVBA-L1 ¹⁾		
200 l/min	For tubing O.D. 8 mm	8058477	SFAH-200U-Q8S-PNLK-PNVBA-L1	
		8058478	SFAH-200U-Q8S-PNLK-PNVBA-M8	
	Female thread G1/4	8058479	SFAH-200U-G14FS-PNLK-PNVBA-M8	
		609555	SFAH-200U-G14FS-PNLK-PNVBA-L1 ¹⁾	
		8158417	SFAH-200B-G14FS-PNLK-PNVBA-M8	
For tubing O.D. 6 mm	8158421	SFAH-200U-Q6S-PNLK-PNVBA-M8		

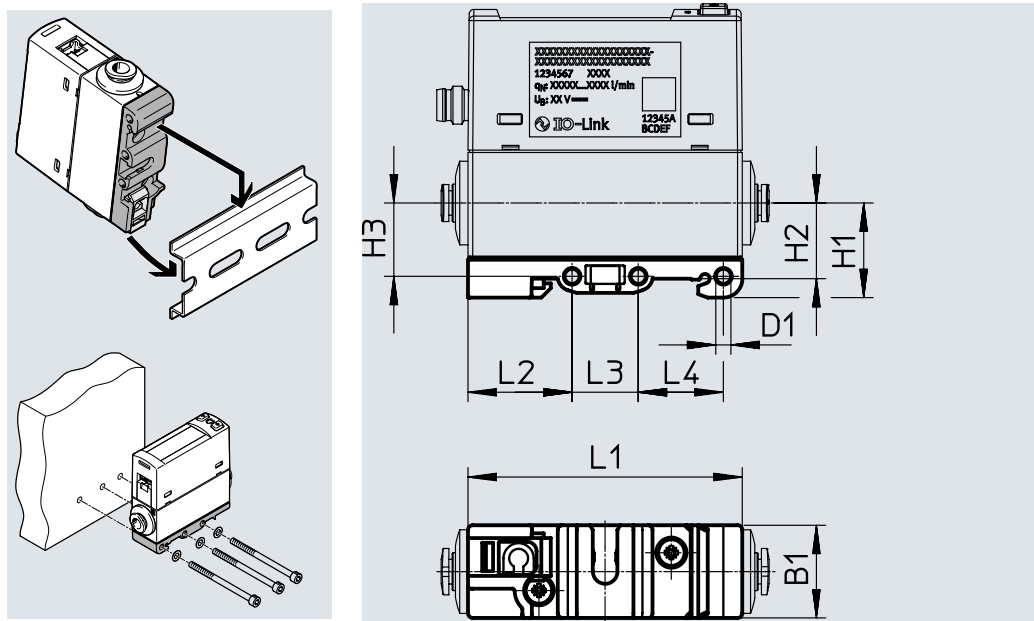
1) Suitable for the production of lithium-ion batteries:

Metals with more than 1% by mass of copper, zinc or nickel are excluded from use. Exceptions are nickel in steel, chemically nickel-plated surfaces, printed circuit boards, cables, electrical plug connectors and coils.

Accessories

H-rail mounting SAMH-FH-H ...

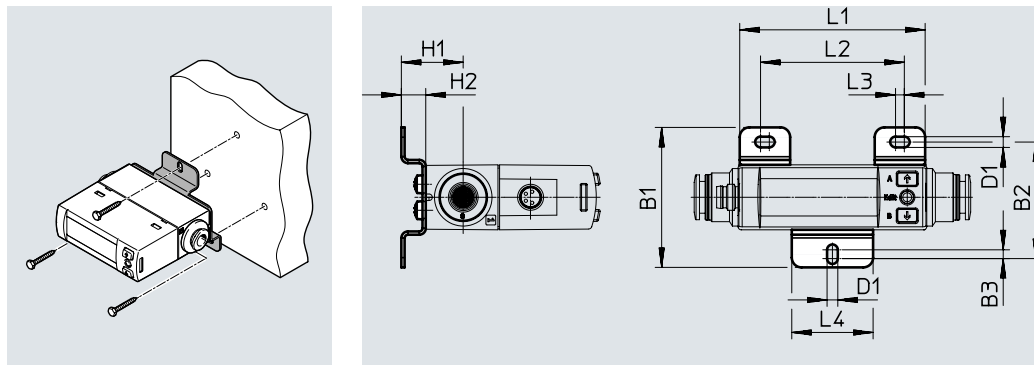
Material: PA, POM, steel
RoHS-compliant



Dimensions and ordering data											
Type	B1	D1 ∅	H1	H2	H3	L1	L2	L3	L4	Part no.	Type
SAMH-FH-H	19.6	3.2	20	16	15.5	58	22	14	18	8058460	SAMH-FH-H

Wall mounting SAMH-FH-W ...

Material: Steel, high-alloy stainless steel, RoHS-compliant



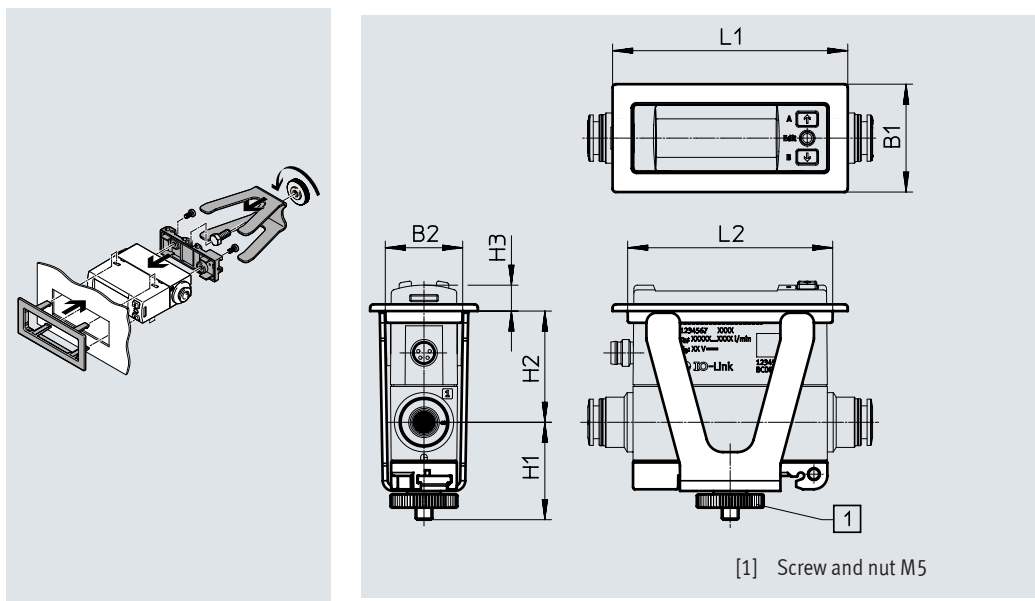
Dimensions and ordering data													
Type	B1	B2	B3	D1	H1	H2	L1	L2	L3	L4	CRC ¹⁾	Part no.	Type
SAMH-FH-W	43.1	35.9	2.7	3.3	18.5	7.5	57	44.2	2.7	25	2	8036910	SAMH-FH-W

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories

Panel mounting kit SAMH-FH-F ...

Material: PA, steel, high-alloy stainless steel
RoHS-compliant



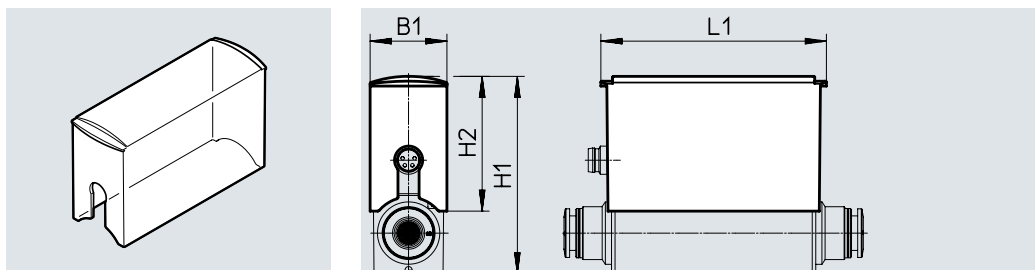
Dimensions										
Type	B1	B2	H1 max.	H2	H3	L1	L2	CRC ¹⁾	Part no.	Type
SAMH-FH-F	32.2	23.1	30	33.2	7.7	70.2	61.2	2	8058459	SAMH-FH-F

1) Corrosion resistance class CRC 2 to Festo standard FN 940070

Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Safety guard SACC-FH-G-S3

Material: PA, RoHS-compliant









Dimensions and ordering data						
Type	B1	H1	H2	L1	Part no.	Type
SACC-FH-G-S3	22.2	~56	38.3	64	8069031	SACC-FH-G-S3

Only in combination with electrical connection M8.

For degree of protection IP54, protection against splashing water from every direction to ISO 20653/DIN EN 60529 with horizontal mounting as illustrated on page 3.

Accessories

Ordering data – Connecting cables				Data sheets → Internet: nebs	
	Number of wires	Cable length [m]	Part no.	Type	
Socket, rectangular design L1					
	4	2.5	572576	NEBS-L1G4-K-2.5-LE4	
M8x1, straight socket					
	4	2.5	541342	NEBU-M8G4-K-2.5-LE4	
M8x1, angled socket					
	4	2.5	541344	NEBU-M8W4-K-2.5-LE4	
Ordering data – Push-in fittings				Data sheets → Internet: qs	
	Pneumatic connection O.D.	For tubing O.D.	Part no.	Type	
Straight connection					
	G1/8	4 mm	186095	QS-G1/8-4	
		6 mm	186096	QS-G1/8-6	
		8 mm	186098	QS-G1/8-8	
	G1/4	6 mm	186097	QS-G1/4-6	
		8 mm	186099	QS-G1/4-8	
		10 mm	186101	QS-G1/4-10	
90° connection					
	G1/8	4 mm	186116	QSL-G1/8-4	
		6 mm	186117	QSL-G1/8-6	
		8 mm	186119	QSL-G1/8-8	
	G1/4	6 mm	186118	QSL-G1/4-6	
		8 mm	186120	QSL-G1/4-8	
		10 mm	186122	QSL-G1/4-10	
Ordering data – Vacuum filter				Data sheets → Internet: vaf	
	Connection	For tubing O.D.	Part no.	Type	
	PK-3	4	535883	VAF-PK-3	
	PK-4	6	15889	VAF-PK-4	
	PK-6	8	160239	VAF-PK-6	